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A new highly aberrant doryctine wasp, *Spathius lubomiri* sp. n. (Hymenoptera, Braconidae, Doryctinae), from Lord Howe Island

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Abstract

Here we describe the doryctine wasp *Spathius lubomiri* **sp. n.**, a highly aberrant member of the genus from Lord Howe Island, which is characterised, among other features, by having the wings reduced to sclerotised rod-like structures, and the dorsal body covered with long bristle-like setae. We also briefly discuss the composition of the hymenopteran fauna and prevalence of reduced wing taxa for the island, and provide a personal account in celebration of Lubo Masner's 75th birthday.

Keywords

Spathius, Doryctinae, Braconidae, wing reduction, brachypterous, micropterous, apterous, Lord Howe Island

Introduction

Lord Howe Island is located approximately 770 km east of the central New South Wales coast and 1,350 km north-west of New Zealand on the submerged Lord Howe Rise (31°33'20"S, 159°05'20"E) (Jennings and Austin 2009). The island is an eroded

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remnant of a 6.9 million-year-old shield volcano (McDougall et al. 1981), is about 10 km long and 1.5 km wide, and has an area of 14.6 km^2. Mount Lidgbird (777 m) and Mount Gower (875 m) dominate the island at the south end (Fig. 1). As an extinct volcanic remnant all of its flora and fauna, with the exception of numerous human introductions, have colonised the island from adjacent landmasses, either by aerial dispersal or rafting. Not surprisingly, a significant proportion of the island's biota is endemic, including almost 50% of plant species. Further, the vertical relief of the island harbours a diverse array of habitats including evergreen rainforest, palm forest, *Pandanus* forest, low dense coastal vegetation, and moss forest at higher altitudes (Pickard 1983).

Although several invertebrate groups, such as Araneae (Gray 1974), Coleoptera (Paramanov 1963) and land snails (Ponder 1982; Cassis et al. 2003), show high levels of endemism, they are generally not well studied and their taxonomy is poorly documented compared with the flora. Without doubt the 'flagship' terrestrial invertebrate for the island is the Lord Howe Island stick insect *Dryococelus australis* (Montrouzier), which was thought to be extinct but was recently rediscovered on Ball's Pyramid, located 20 km south-east of the island (Pridell et al. 2003).

The Hymenoptera of Lord Howe Island are mainly known from a series of surveys and collecting trips undertaken over the last 85 years, mostly focused on obtaining other insect groups. These have resulted in the description of several reduced-winged Scelionidae belonging to a number of genera (Dodd 1924; Galloway 1982; Austin 1984, 1986), but no comprehensive assessment of the hymenopteran fauna has yet been undertaken. The most recent survey in 2000–2001 undertaken by the Australian Museum (Cassis et al. 2003), indicates that most of the common hymenopteran families are present on the island, and also hints at relatively high levels of species endemicity. However, comprehensive data on the wasp fauna of the island and adjacent mainland are mostly lacking and thus such a statement is premature. The exception is the formicid fauna which was treated in detail by Cassis et al. (2003).

Our original purpose was to examine the hymenopteran material collected during the 2001 survey and held in the Australian Museum, to examine the fauna of Platygastroidea on the island as part of our contribution to the *Platygastroidea Planetary Biodiversity Inventory Project*. Unfortunately, very few specimens of this group were collected, probably due to the fact that neither Malaise or yellow pan traps were used as part of the survey's collecting regime. However, in sorting through the available material we recognised a highly aberrant reduced-winged member of the braconid subfamily Doryctinae belonging to the genus *Spathius* Nees, which we here describe in celebration of Lubo Masner's 75th birthday. At the same time we provide a overview of the hymenopteran fauna of the island, and briefly discuss the prevalence of reduced-winged species.

Materials and methods

The specimens were examined and imaged under a Nikon DXM1200 stereomicroscope using Automontage software. Morphological terms generally follow Wharton et al. (1993), and terms for surface sculpturing follow Eady (1968) and Harris (1979). Collection abbreviation: AM: Australian Museum, Sydney.

Subfamily Doryctinae
Genus *Spathius* Nees, 1818

Comments. Following a detailed treatment of Australasian genera of Doryctinae (Belokobilskij et al. 2004), the genus is well diagnosed for the region and represented by some 21 described species (only two for mainland Australia, *S. kurandaensis* Nixon and *S. turneri* Nixon). However, no species have been treated since Nixon's (1943) revision of the Old World fauna and about 80% of species in collections remain undescribed. Like other members of the Doryctinae, *Spathius* spp. are idiobiont ectoparasitoids and, in the Northern Hemisphere, they parasitise the larvae of xylophagous or bark-boring Coleoptera, as well as sawflies and lepidopteran larvae living in xylophagous niches. For the Australasian region, only coleopteran hosts have been recorded for doryctines (none are known for *Spathius*), although host data are available for very few species (see Belokobilskij et al. 2004).

Spathius lubomiri sp. n.
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Type-material. Holotype. Female. NSW: Mt. Gower walking trail, Lord Howe Is.; 31.35.12; 159.4.35; 28-Nov-2000; ex *Bubbia howeana*; P. Flemons, J. Tamawski; LHIS050/028 (beating) (AM).

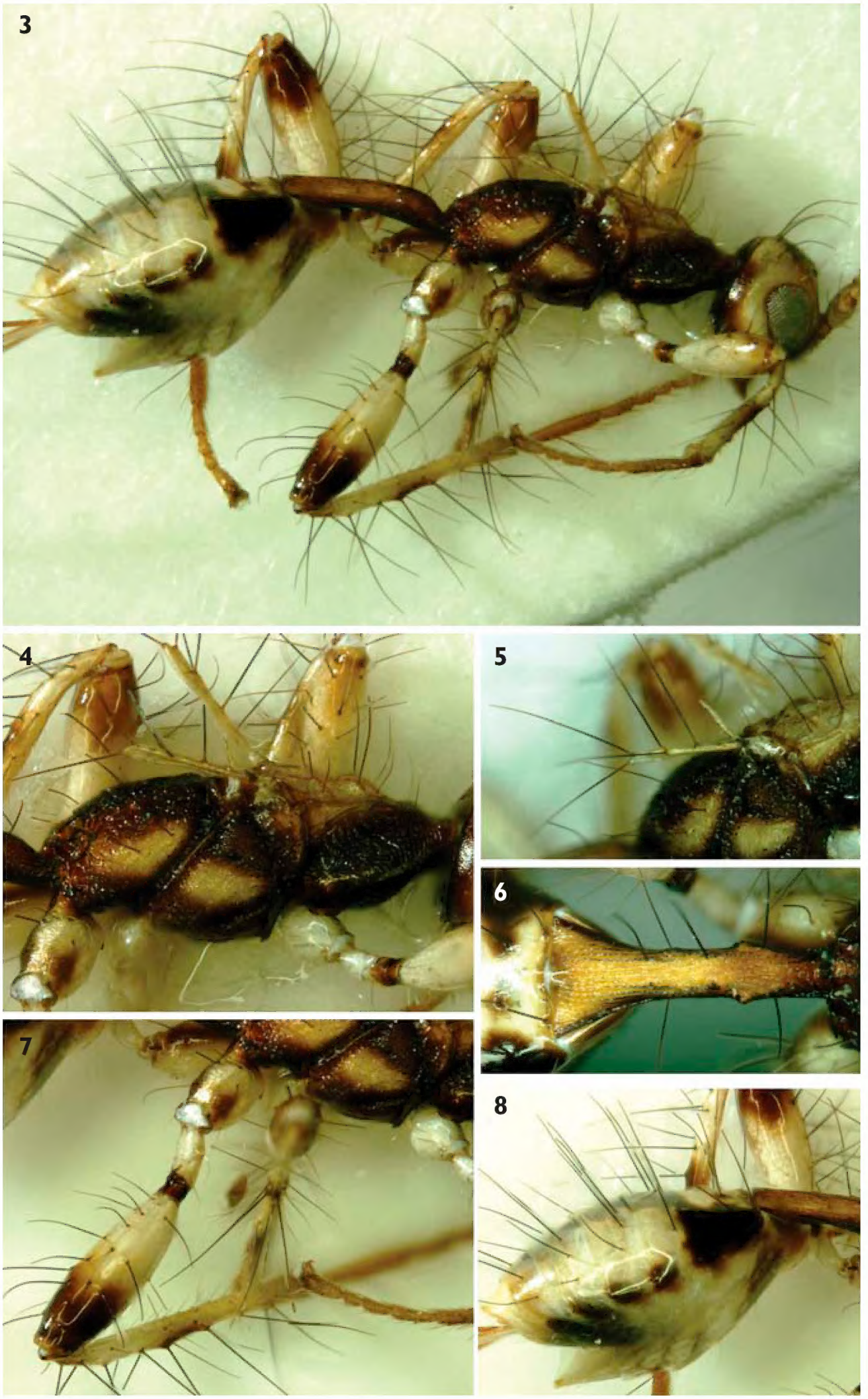
Paratype. Male. NSW; eastern slope of Phillip Point (North Head); Lord Howe Is.; 31.31.20; 159.2.29; 01-Dec-2000; CBCR, Australian Museum; LHIS015L leaf litter ex Closed Rain Forest – *Drypetes/Cryptocarya* habitat (AM).

Diagnosis. This species differs from all other known *Spathius* (both described and undescribed) by the dorsal body, metapleuron, forewing and legs possessing extremely long bristle-like setae, the wings being brachypterous, rod-like and reaching just past the middle of propodeum, and the body having a mottled white, dark brown and brown pattern.

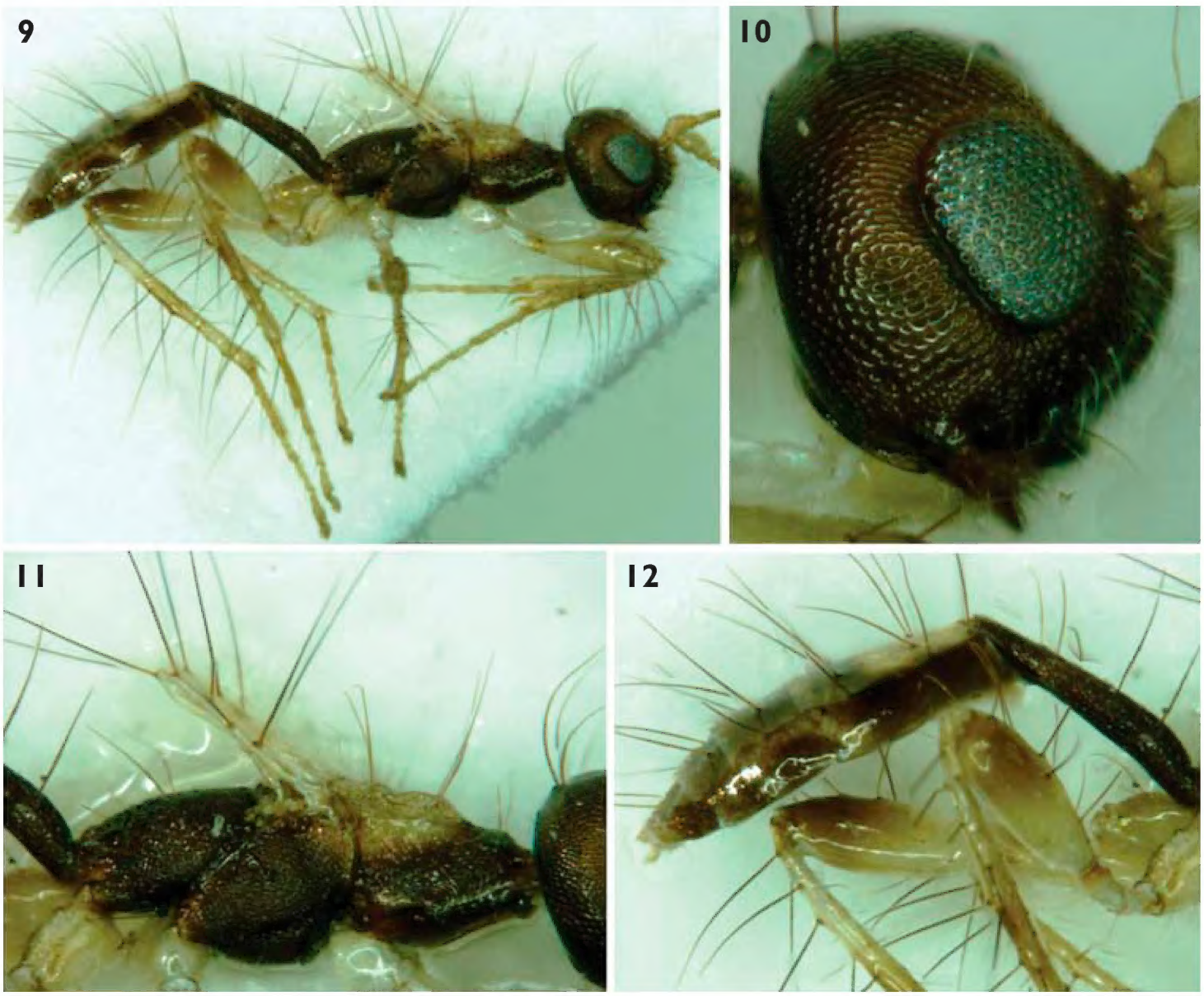
Description. Female. body 3.9 mm long (without ovipositor).

Colour. Creamy white with extensive dark brown and brown markings giving appearance of a mottled pattern; face brown with cream margins; frons brown with broader cream margins; vertex brown but with narrow brown band joining dark brown occiput; temples cream around eyes, brown posteriorly; pronotum dark brown; scutum

Figures 1–2. Lord Howe Island. **1** view south from Kim's Lookout showing Mount Lidgbird (left) and Mt Gower (right) **2** view north from summit of Mt Gower.



Figures 3–8. *Spathius lubomiri* sp. n. female holotype. **3** lateral view of whole body (length 3.9 mm) **4** lateral view of mesosoma showing wings **5** lateral view of posterior mesosoma showing wings **6** dorsal view of first metaosomal tergite **7** hind leg **8** lateral view of metasoma.



Figures 9–12. *Spathius lubomiri* sp. n. male paratype. **9** lateral view of whole body (length 2.5 mm) **10** lateral view of head **11** lateral view of mesosoma showing wings **12** lateral view of metasoma and hind legs.

and scutellum cream with brown margins; metanotum brown; mesopleuron and metapleuron dark brown, but with large central cream patch; propodeum dark brown; legs creamy white with various brown patches and bands; hind leg dark brown in distal one-third; wings cream; first metasomal tergite light brown dorsally, dark brown laterally and in basal one-quarter; second tergite with broad cream patch medially, dark brown, along lateral and posterior margins, cream patch with two small brown spots; rest of metasoma cream with broad dorso-longitudinal dark brown band, broad dark brown patches on lateral tergites and on second sternite; ovipositor and sheaths pale brown.

Head. With fine punctuate sculpture; face and lower gena with sparse long yellow hairs, the longest about 0.5 eye height; vertex with 6 very long black bristle-like setae, the longest about 1.5 × eye height, frons and temples with a few long brown hairs; antennal scape with single long black bristle-like seta; antennae longer than body.

Mesosoma. Dorsal pronotum with fine rugulose sculpture and two bristle-like setae, lateral surface rugulose-punctate, becoming more strigose along posterior margin; scutum with 7 very long black bristle-like setae, the longest about 1.5 × eye height, rugulose within boundaries of very broad shallow notauli, rest of scutum faintly rugu-

lose punctuate; scutellum and metanotum mostly smooth around carinae; propodeum with 7 long black bristle-like setae, the longest about 1.0 × eye height, dorsal surface more coarsely rugulose-punctate with strigose elements, including an irregular mid longitudinal carina in anterior two-thirds; mesopleuron and metapleuron irregularly rugulose-punctate with anterior and posterior margins punctuate; anterior and lateral pronotum and lateral mesosoma including propodeum with scattered long yellow hairs; dorsal surface of mid and hind coxae faintly rugulose-punctate, the rest of the legs smooth; femur, tibia and first tarsal segment with scattered very long black bristle-like setae, the longest about 1.5 × eye height, interspersed among these are scattered long yellow hairs.

Wings. Forewing rod-like, with narrow membranous flange, reaching to just past mid-point of propodeum, with 4–5 very long black bristle-like setae, the longest about 1.5 x eye height; hindwing rod-like, about 0.5 × length of forewing, with several long hairs, but lacking black bristle-like setae.

Metasoma. First tergite more than 3 × its distal width, longitudinally rugulose in basal one-third, the remainder longitudinally striate, with 7 scattered very long black bristle-like setae, the longest about 1.2 × eye height; remaining tergites smooth, with 4–6 very long black bristle-like setae, on tergites 3–6 forming a transverse row; ovipositor about 2.3 mm long, slightly longer than metasoma.

Male. Same as female except smaller, 2.5 mm long; colour more extensively dark brown, legs with pale brown markings; head and mesopleuron densely punctate; first tergite of mesosoma more uniformly rugulose, without striate pattern posteriorly.

Etymology. We have much pleasure in naming this species after our friend and colleague Lubomír Masner.

Distribution and habitat. Only known from the type locality, Lord Howe Island. Interestingly the male and female specimens have been collected from different ends of the island in quite different habitats; the male from Phillip Point at the north end of the island amongst leaf litter in closed rain forest comprising *Drypetes* and *Cryptocarya*, and the female about 7 km away at the southern end of the island among *Bubbia howeana* above the ground.

Comments. Although we have seen several undescribed *Spathius* from Australasia and the Oriental Region that have long hairs over parts of the body, in all cases these are species that have similar hairs compared with most other doryctines, except they are simply longer than normal. We have not seen any other *Spathius* or other Doryctinae that have the bristle-like setae of *S. lubomiri*. A this stage we do not know what is the function of these setae, but speculate that they may represent an anti-predator adaptation or, in some unknown way, may be related to host exploitation.

Discussion

The hymenopteran material in the Australian Museum collected on the 2001 insect survey of Lord Howe Island (Cassis et al. 2003) comprises 238 'morphospecies' of

parasitic and predatory wasps (i.e. Apocita not including Formicidae and Apidae s.l.). This is not dissimilar to the estimate of 300 spp. for the island made by Holloway (1981), as the AM material undoubtedly provides an underestimate given that, for example, several different microgastrine braconid species are counted as a single morphospecies, and several described scelionids are not represented. From the survey, the Braconidae is the most species-rich family with 42 spp., followed by Ichneumonidae (31 spp.), Diapriidae (17 spp.) Pteromalidae (16 spp.), Encyrtidae/Scelionidae (14 spp. each) and Eulophidae (13 spp.). Although these results are undoubtedly influenced by the restricted collecting methods used, they nonetheless show a different pattern of reduced wing forms: Scelionidae (43%), Encyrtidae (29%) Diapriidae (24%), Pteromalidae (19%), Braconidae (5%) and Ichneumonidae/ Eulophidae (0%).

The reduced-winged Braconidae are represented by just two species; *S. lubomiri* and a second probably undescribed *Spathius*, which is generally similar to numerous undescribed taxa found on the adjacent mainland. Iqbal et al. (2003) report that approximately one-third of the estimated 90+ species of Australasian *Spathius* are brachypterous or micropterous, and that most of these are found in the wetter forested areas of eastern Australia, Tasmania and New Zealand. However, the vast majority of these species have an obvious membranous component to their reduced wings and only 3–4 species have the wings heavily sclerotised and developed as elongate rod-like extensions, as in *S. lubomiri.* For those species found on mainland Australia, wing reduction in *Spathius* is probably an adaption for living on the forest floor and accessing host larvae in litter (Iqbal et al. 2003). However, wing reduction is also prevalent among *Spathius* found on islands in the region and, apart from Lord Howe Island, brachypterous and micropterous species are known from Norfolk Island, and four islands around New Zealand: Three Kings Island, Stewart Island, Stephens Island and Chatham Island.

Other reduced-winged doryctines that occur in Australasia include the genera *Australospathius* Belokobilskij, Iqbal & Austin (10 spp.), *Doryctopsis* Belokobilskij, Iqbal & Austin (1 spp.) and some *Caenophanes* Foerster (4 spp.) (Belokobilskij et al. 2004). Interestingly, *Australospathius* is superficially similar to the recently described but unrelated genus *Oroceguera* Seltmann & Sharkey, 2007 from Costa Rica. Both are very ant-like in appearance, lack ocelli and are likely to be restricted to deep litter or some subterranean habitat.

In recognition of Lubo Masner (A.D. Austin). I have been corresponding with Lubo since 1976 when I was undertaking a project on spiders as an undergraduate honours student. I had reared a number of scelionids from spider eggs and could not find out anything about them. Lubo responded to my first letter, as he still does today, with a wealth of information, excitement and a plethora of ideas. What followed has been a productive and very enjoyable collaboration over the last 30 years. My file of correspondence with Lubo is several centimetres thick, although it stops at about 2000, when everything became electronic. This was a pity in many respects. It has certainly made communication faster, but now I do

not get letters from Lubo with his excellent annotated sketches of morphological structures. Without doubt the most rewarding aspect of my interactions with Lubo have been the five or so visits I have made to Ottawa. These started in 1984 when I had a Royal Society Fellowship to spend three months with Lubo to study the comparative morphology of the platygastroid ovipositor system, a veritable Pandora's box of characters. On my last visit to Ottawa Lubo provided me with many of the specimens we later used for the first molecular phylogeny of platygastroids, which became one of the foundations for the Platygastoid PBI project. During my career there is no doubt that Lubo stands alone as the most enthusiastic, knowledgeable and freely-giving of everyone with whom I have worked. The only down side of course is that, even now at 75, we still cannot keep up with his frenetic pace and it always takes a day or two to recover from a Lubo visit!

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